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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/748,466	12/30/2003	Cheolsoo Park	20059/PIA31227	7065
34431	7590	05/09/2005	EXAMINER	
HANLEY, FLIGHT & ZIMMERMAN, LLC			CHEN, JACK S J	
20 N. WACKER DRIVE			ART UNIT	
SUITE 4220			PAPER NUMBER	
CHICAGO, IL 60606			2813	

DATE MAILED: 05/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/748,466

Applicant(s)

PARK, CHEOLSOO

Examiner

Jack Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 February 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4 and 6-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

In response to the communication filed on February 14, 2005, claims 1-4 and 6-8 are active in this application.

#### ***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

#### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Re claim 4, the phrase "wherein a local channel ion implantation is performed before ... if ... an increased resistance" does not positively recite the processes.

#### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-4 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chong et al., U.S./6,727,151 B2 in view of Nishida et al., U.S. Pub. No. 2003/0151098 A1.

Chong et al. Teach a method for forming a semiconductor device, which *comprises* [The transitional term "comprising", which is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and *does not exclude additional, unrecited elements*] forming an isolation region (STI, col. 2, lines 40-45) in a semiconductor substrate and sequentially depositing a pad oxide layer 12, a pad nitride layer 14 and a first oxide layer 16 on the substrate and the isolation region (fig. 1); patterning the first oxide layer and the pad nitride layer to form a gate electrode opening (fig. 2); depositing a doped polysilicon layer 24 (fig. 5) over the whole semiconductor substrate including the opening; etching back the doped polysilicon layer until the pad oxide layer is exposed to form a doped polysilicon sidewall 26 on a sidewall of the pad nitride layer and the first oxide layer (fig. 6, Note: the doped polysilicon sidewall does not require to be in contact with the pad nitride and the first oxide layers), wherein the doped polysilicon sidewall is used to server as the lightly doped drain (LDD) implantation (col. 3, lines 4-13); etching the pad oxide layer (figs. 6-7) exposed by the doped polysilicon sidewall to expose the semiconductor substrate; forming a gate isolation layer 34 on the exposed semiconductor substrate (fig. 9); sequentially depositing and planarizing a gate isolation layer 34 and a metal layer 36 on the substrate to form the gate electrode (figs. 9-10); and forming a source and a drain, see figs. 1-12; cols. 1-8 for more details.

Re claim 2, Chong et al. shows wherein the isolation region is STI (col. 2, lines 40-45).

Re claim 3, Chong et al. shows wherein a thickness of the pad oxide layer is not less than 50 angstroms (i.e., 100 angstroms; see col. 2, lines 45-55).

Re claim 4, Chong et al. shows wherein a local channel ion implantation is performed before depositing the gate isolation layer (in this case, layer 24/26 is used as LDD; ion implantation for threshold voltage control is considered as the local channel ion implantation; see col. 3 for more details) if the source or drain region have an increased resistance.

Re claim 8, Chong et al. inherently shows the thickness of the pad oxide layer under the doped polysilicon sidewall is controlled to be used to serve as the LDD implantation since the same processes are carried out.

Chong et al. disclosed above; however, Chong et al. is silent to using gate nitride and the metal layer as the gate electrode and further forming contacts to the gate, source and drain.

Nishida et al. teach a method for forming a semiconductor device, which includes the steps of forming the gate isolation layer DE on the exposed surface of the substrate 1 (fig. 13); sequentially depositing and planarizing a gate isolation layer DE, a gate nitride layer BM (Re claim 6, TiN) and a metal layer GE (Re claim 7, tungsten) on the substrate 1 to form the gate electrode (fig. 13, page 7, paragraphs 0110-0113); and forming a source and a drain, a gate plug, a source plug and drain plug (fig. 15), see figs. 1-17, page 1-8 for more details.

Therefore, the subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to use TiN and tungsten for the gate electrode as taught by Nishida et al. in the method of Chong et al. in order to improve the adhesive strength of the metal gate and prevent the impurities (TiN acts as a barrier). And further forming

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the S/D and gate contacts (S/D and gate plugs) as taught by Nishida et al. in the method of Chong et al. in order to provide an operated device.

### *Response to Arguments*

6. Applicant's arguments filed February 14, 2005 have been fully considered but they are not persuasive.

Applicant argues that the prior art (Chong et al.) teach using dual sidewalls 22/26 having different doping concentrations, and it therefore does not read on the instant claimed invention. It is respectfully submitted that the instant claimed invention does not preclude/exclude other elements/layers since the term "comprising" is used. An open-ended phrase "*comprising*" which is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. "The transition comprising" in a method claim indicates that the claim is open-ended and allows for additional steps. "Comprising" is a term of art used in claim language which means that the named elements are essential, but other elements may be added and still form a construct within the scope of the claim. See, *Invitrogen Corp. v. Biocrest Mfg., L.P.*, 327 F.3d 1364, 1368, 66 USPQ2d 1631, 1634 (Fed. Cir. 2003); *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501, 42 USPQ2d 1608, 1613 (Fed. Cir. 1997) (""); *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 229 USPQ 805 (Fed. Cir. 1986); *In re Baxter*, 656 F.2d 679, 686, 210 USPQ 795, 803 (CCPA 1981); *Ex parte Davis*, 80 USPQ 448, 450 (Bd. App. 1948) ("comprising" leaves "the claim open for the inclusion of unspecified ingredients even in major amounts"). In this case, even with the

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presence of additional layer(s), based on the broadest interpretation, the rejected claims are within the scope of the combination of Chong et al. and Nishida et al. disclosure.

### *Conclusion*

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jack Chen whose telephone number is (571)272-1689. The examiner can normally be reached on Monday-Friday (9:00am-6:30pm) alternate Monday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead can be reached on (571)272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jack Chen  
Primary Examiner  
Art Unit 2813

May 4, 2005